



Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

February 27, 2009

10 CFR 50.73

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
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Washington, D. C. 20555-0001

**TENNESSEE VALLEY AUTHORITY - BROWNS FERRY NUCLEAR PLANT (BFN) -  
UNIT 1 - DOCKET 50-259 - FACILITY OPERATING LICENSE DPR - 33 - LICENSEE  
EVENT REPORT (LER) 50-259/2007-002-01**

The enclosed report provides additional details concerning a manual reactor scram on Unit 1 due to an Electro-Hydraulic Control (EHC) leak that could not be isolated. At the time of the event, the Unit 1 reactor was in the startup mode and not tied to the grid. BFN re-investigated the circumstances surrounding the event and identified a different root cause than originally submitted. Accordingly, TVA is providing Revision 1 to LER 259/2007-002. Revised portions of the LER are identified by a vertical line in the right margin.

In accordance with 10 CFR 50.73(a)(2)(iv)(A), TVA is reporting this event as an unplanned manual actuation of the reactor protection system. There are no commitments in this letter.

Sincerely,

R. G. West  
Site Vice President

cc: See page 2

IE22  
NRR

U.S. Nuclear Regulatory Commission

Page 2

February 27, 2009

Enclosure

cc (Enclosure):

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## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

## 1. FACILITY NAME

Browns Ferry Nuclear Plant Unit 1

## 2. DOCKET NUMBER

05000259

## 3. PAGE

1 OF 5

## 4. TITLE

Manual Scram Due To An Unisolable EHC Leak

## 5. EVENT DATE

MONTH	DAY	YEAR
05	24	2007

## 6. LER NUMBER

YEAR	SEQUENTIAL NUMBER	REV NO.
2007	002-01	

## 7. REPORT DATE

MONTH	DAY	YEAR
02	27	2009

## 8. OTHER FACILITIES INVOLVED

FACILITY NAME	DOCKET NUMBER
none	N/A
FACILITY NAME	DOCKET NUMBER
none	N/A

## 9. OPERATING MODE

2

## 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)	20.2203(a)(3)(I)	50.73(a)(2)(i)(C)	50.73(a)(2)(vii)
20.2201(d)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(A)
20.2203(a)(1)	20.2203(a)(4)	50.73(a)(2)(ii)(B)	50.73(a)(2)(viii)(B)
20.2203(a)(2)(i)	50.36(c)(1)(i)(A)	50.73(a)(2)(iii)	50.73(a)(2)(ix)(A)
20.2203(a)(2)(ii)	50.36(c)(1)(ii)(A)	X 50.73(a)(2)(iv)(A)	50.73(a)(2)(x)
20.2203(a)(2)(iii)	50.36(c)(2)	50.73(a)(2)(v)(A)	73.71(a)(4)
20.2203(a)(2)(iv)	50.46(a)(3)(ii)	50.73(a)(2)(v)(B)	73.71(a)(5)
20.2203(a)(2)(v)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(C)	OTHER
20.2203(a)(2)(vi)	50.73(a)(2)(i)(B)	50.73(a)(2)(v)(D)	specify in Abstract below or in NRC Form 366A

## 10. POWER LEVEL

001

## 12. LICENSEE CONTACT FOR THIS LER

## NAME

Steve Austin, Licensing Engineer

## TELEPHONE NUMBER (Include Area Code)

256-729-2070

## 13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX

## 14. SUPPLEMENTAL REPORT EXPECTED

☐

YES (if yes, complete 15. EXPECTED SUBMISSION DATE)

☒

NO

15. EXPECTED  
SUBMISSION  
DATE

MONTH	DAY	YEAR
N/A	N/A	N/A

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 24, 2007, at 0211 CDT, Unit 1 operators initiated a manual scram due to an Electro-Hydraulic Control (EHC) [TG] leak that could not be isolated. The reactor was in the startup mode and the generator was not tied to the grid. TVA's causal analysis indicates the inadequate application of the work control process during Unit 1 recovery activities. Weakness in the work control process used during Unit 1 restart activities allowed work to be performed on the EHC System using a generic work order while the system was pressurized. A common practice during recovery of Unit 1 restart effort was to use generic work orders to provide the broadest scope of work and maximum flexibility for the craft personnel. The current work control process has checks and balances to ensure that work is properly evaluated, planned and documented, commensurate with the sensitivity of the equipment and the risk of the activity.

The damaged tubing was removed and the connection repaired. TVA is reporting this event in accordance with 10 CFR 50.73(a)(2)(iv)(A). This scram event is reportable within 4 hours under 10 CFR 50.72(b)(2)(iv)(B), any event or condition that results in a valid actuation of the Reactor Protection System, and within 8 hours under 10 CFR 50.72(b)(3)(iv)(A), any event that results in an actuation of the specified systems. This event also required a 60-day written report in accordance with 10 CFR 50.73(a)(2)(iv)(A).

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Browns Ferry Nuclear Plant Unit 1	05000259	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 5
		2007	-- 002	-- 01	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

## I. PLANT CONDITION(S)

At the time of the reactor scram event, Unit 1 was in Mode 2 (startup) at approximately 958 psig and 35 megawatts thermal. Unit 2 was in Mode 1 at 100 percent reactor power (approximately 3456 megawatts thermal). Unit 3 was in Mode 1 at 100 percent reactor power (approximately 3456 megawatts thermal). Units 2 and 3 were unaffected by the event.

## II. DESCRIPTION OF EVENT

A. Event:

On May 24, 2007, at 0208 hours, Central Daylight Time (CDT), the Unit 1 Control Room received a low Electro-Hydraulic Control (EHC) [TG] Pressure and indication that the standby EHC pump had started. At approximately 0209 hours CDT, the main turbine was manually tripped. At approximately 0211 hours CDT, Browns Ferry Unit 1 initiated a manual reactor scram due to an EHC System pressure lowering and reservoir level lowering due to an EHC system leak.

The scram was uncomplicated. All control rods fully inserted. All systems responded as required to the manual scram signal. No Emergency Core Cooling System (ECCS) initiations occurred as a result of the scram. Reactor water level was maintained in the normal band during the event. There were no Primary Containment Isolation signals received during the scram. There were no indications of main steam relief valves (MSRVs) opening. Reactor pressure was controlled using Main Steam Line Drains. Reactor Level was maintained in band using Control Rod Drive pumps [AA].

When the leak was initially discovered, it was about 60 drops per minute. When repairs were attempted, the tubing separated, resulting in the loss of EHC pressure and the need for the scram. Approximately 600 gallons of EHC fluid was discharged out of the break onto the turbine building floor. Repair of the EHC leak was performed. Cleanup of the EHC fluid was completed and environmental monitoring assured no offsite release of the spill.

This LER is being issued in accordance with 10 CFR 50.73(a)(2)(iv)(A). TVA reported this event within 4 hours under 10 CFR 50.72(b)(2)(iv)(B), as any event or condition that results in a valid actuation of the Reactor Protection System; and within 8 hours under 10 CFR 50.72(b)(3)(iv)(A), any event that results in an actuation of the specified systems.

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

None.

C. Dates and Approximate Times of Major Occurrences:

May 24, 2007 at 0208 hours CDT	Control Room received a low EHC Pressure alarm and a standby EHC pump started
May 24, 2007 at 0209 hours CDT	The main turbine was manually tripped
May 24, 2007 at 0211 hours CDT	The reactor was manually scrammed
May 24, 2007 at 0348 hours CDT	A four-hour non-emergency report was made to the NRC pursuant to 10 CFR 50.72(b)(2)(ii) and

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Browns Ferry Nuclear Plant Unit 1	05000259	2007	-- 002	-- 01	3 OF 5

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

an 8-hour report in accordance with  
10 CFR 50.72(b)(3)(iv)(A).

**D. Other Systems or Secondary Functions Affected**

None.

**E. Method of Discovery**

Operators received alarms indicating an EHC leak had occurred.

**F. Operator Actions**

Operations personnel responded to the event in accordance with applicable plant procedures.

**G. Safety System Responses**

All required safety systems operated as designed.

**III. CAUSE OF THE EVENT****A. Immediate Cause**

The immediate cause of the event was a failure of a compression fitting in a stainless steel tubing connection. The original tube flaring was not performed correctly. The tubing was not cut square. Hence, a proper flare was not formed and a proper seal could not be established.

**B. Root Cause**

TVA's causal analysis indicates the inadequate application of the work control process during Unit 1 recovery activities. Weakness in the work control process used during Unit 1 restart activities allowed work to be performed on the EHC System using a generic work order while the system was pressurized.

**C. Contributing Factors**

None.

**IV. ANALYSIS OF THE EVENT**

The current work control process has checks and balances to ensure that work is properly evaluated, planned and documented, commensurate with the sensitivity of the equipment and the risk of the activity. A common practice during recovery of Unit 1 was to use generic work orders to provide the broadest scope of work and maximum flexibility for the craft personnel. While this concept was acceptable for a construction environment, the use of a miscellaneous, system wide, repair work order was not appropriate for an operating unit.

The work order used to repair the EHC System did not consider the tubing as a critical component or recognize the risk associated with working on the system at pressure. As a result, the process did not apply the checks and balances normally applied to critical component maintenance or high risk activities. The individuals involved followed less than adequate work control procedures while attempting a leak repair on a pressurized system. They did not recognize the consequences of

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Browns Ferry Nuclear Plant Unit 1	05000259	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 5
		2007	-- 002	-- 01	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

their actions and, as a result, the attempted repair resulted in the failure of the flared fitting and subsequent loss of EHC fluid.

**V. ASSESSMENT OF SAFETY CONSEQUENCES**

The safety consequences of this event were not significant. The evaluation of plant system and component responses to the event concluded that responses were as designed and within the time-frames expected. The normal heat removal path was not lost during this event and no main steam relief valves opened. No ECCS initiated during this event as a result of the reactor low power level condition. Personnel performance in response to the tube failure was also evaluated and found to be timely, appropriate, and met expectations for performance during an event of this type. There were no equipment failures during or following the scram that complicated recovery. In addition, there was no radioactive material released and no actual or potential safety consequences as a result of this event.

Therefore, this event did not adversely affect the safety of plant personnel or the public.

**VI. CORRECTIVE ACTIONS****A. Immediate Corrective Actions**

Monitored and controlled Unit 1 plant parameters. Operations personnel placed the reactor in a stable condition in accordance with plant procedures.

**B. Corrective Actions to Prevent Recurrence<sup>(1)</sup>**

The failed compression fitting was replaced with a new fitting. Post modification testing was performed satisfactorily with no leaks. Also, additional inspections were performed on the EHC lines that connect to the other control intercept valves, bypass valves, stop valves and control valves, as well as connections on the EHC skid, to look for signs of distressed fittings or misaligned tubing that might be susceptible to failure. None were identified that required rework. This inspection did not identify any poor flares, damaged fittings, scarred/galled surfaces or brittle/damaged tubing.

TVA revised the work control process to prohibit the use of a generic or miscellaneous system work order to perform maintenance activities on an operating system in support of a critical reactor if any portion of the system is designated as a critical component.

**VII. ADDITIONAL INFORMATION****A. Failed or Degraded Components**

None.

**B. Previous LERs on Similar Events**

None.

**C. Additional Information**

Browns Ferry corrective action document PER 125288.

<sup>1</sup> TVA does not consider these corrective actions regulatory commitments. The completion of these actions will be tracked in TVA's Corrective Action Program.

# LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Browns Ferry Nuclear Plant Unit 1	05000259	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 5
		2007	-- 002	-- 01	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

**D. Safety System Functional Failure Consideration:**

This event is not a safety system functional failure in accordance with NEI 99-02.

**E. Scram With Complications Consideration:**

This event was not a complicated scram in accordance with NEI 99-02.

**VIII. COMMITMENTS**

None.